

Small Unit Operations Situation Awareness System

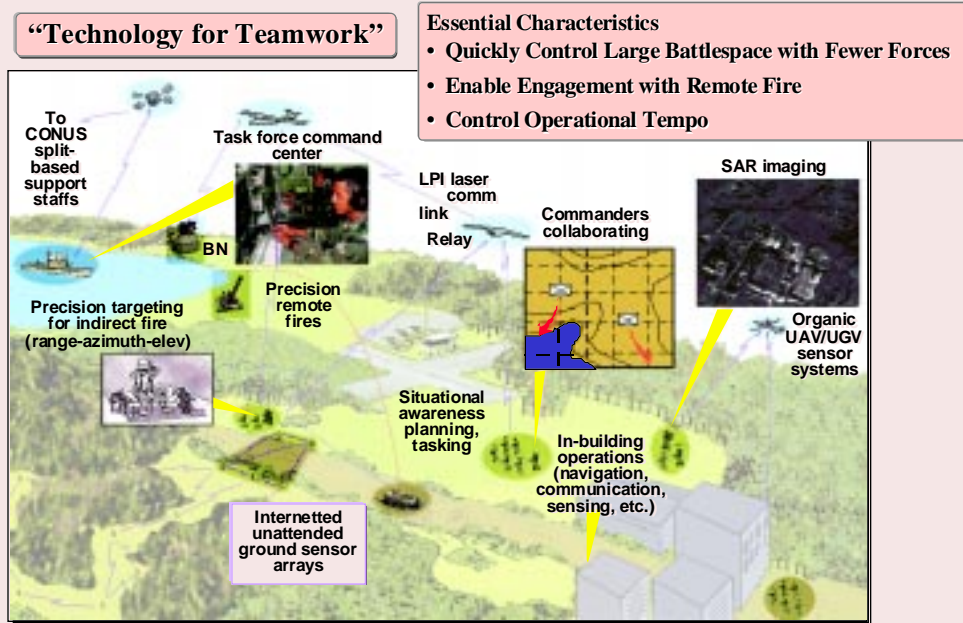


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Small Unit Operations Vision



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The vision for Small Unit Operations is to develop and integrate tomorrow's technologies into a Situation Awareness System that provides the battalion commander down to the individual soldier with reliable communications and situation awareness in restrictive environments.

DSB 96: Four Crucial Enablers for Future Ground Warfare



Fielding the Information Infrastructure

Turning Situation Awareness into Situation Understanding

Making Remote Fires Work

Operating in a Dispersed Posture

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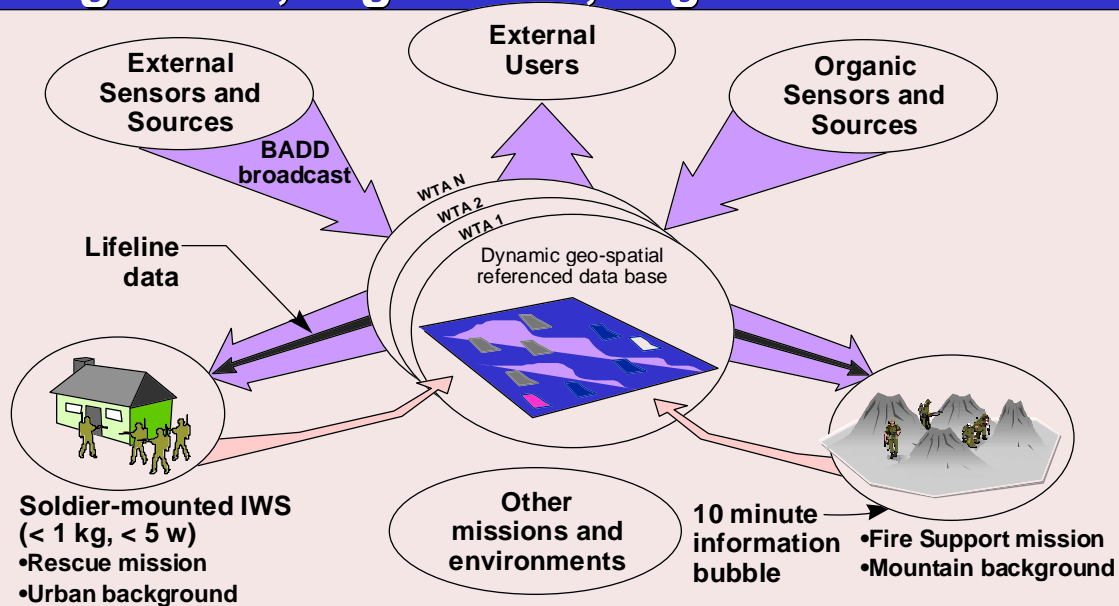
The SAS extends the information infrastructure from the battalion down to the individual soldier and allows him to communicate reliably in terrain and urban settings that previously were not possible.

The SAS will collect, fuse, filter and distribute information to the warfighter in a tailored manner that intelligently addresses the role and mission of the warfighter, his current tactical situation, and the nature of the data. This will be accomplished to ensure that the warfighter not only is aware of the situation around him, but that he understands it and can make tactically sound decisions based on his understanding.

The SAS will decrease the time it takes to communicate tactical information from the sensor to the shooter (and to anyone potentially impacted by the target), to improve the probability of kill. It will also provide a method for rapidly communicating assessments of battle damage from the warfighter to higher echelons.

The SAS will enable dispersed operations and self-synchronization of forces/individual warfighters by providing the precise location of each warfighter, and by tracking progress against plans. Low probability of detection/interception (LPD/I) techniques will enable stealthy maneuvering.

Situation Awareness System: Right Info, Right Time, Right Place



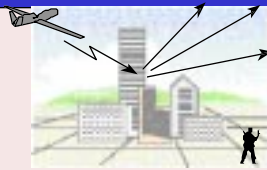
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The SAS maintains a bubble of situation awareness around each SUO warfighter in the area of operations. This bubble provides the warfighter with information on friendly, neutral and hostile forces, as well as terrain, cultural and other relevant information. The premise is to get the right information to the right person at the right time. Data used to develop this bubble comes primarily from the external BADD system, local SUO sensors and the SUO warfighters themselves. Data pertinent to the SAS is maintained on a localized dynamic database as part of the Warfighters Tactical Associate (WTA) function.

Each SUO warfighter carries an Individual Warfighters System (IWS) which provides lightweight communications and situation information to the warfighter, and communicates new tactical information generated by the warfighter to the WTA's dynamic database.

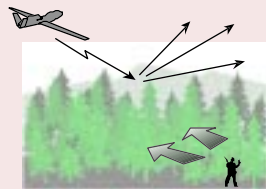
In addition to its database function, the WTA provides router/server functions for the SAS network, and it executes the SAS situation awareness applications to provide collaborative planning, situation forecasting, tactical opportunity recognition, guardian angel and other services. The WTA also directs SUO-obtained tactical data backup through the Battlefield Awareness Data Dissemination (BADD) system to be integrated into higher command level databases.

SAS Must Operate in Restrictive Environments



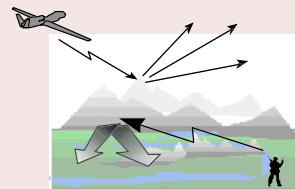
URBAN

- Blockage
- Inside buildings
- Rapid/frequent changes in connectivity
- Smaller operating area



FORESTED

- Bulk attenuation
- No natural relay sites



MOUNTAINOUS

- Blockage
- Longer distances
- Inaccessible relay sites

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Restrictive environments pose a severe challenge to the design of the SAS. Although the current focus is on urban environments, the SAS must be capable of operating in forested and mountainous regions also.

In urban environments, the SAS must be capable of providing communications and situation awareness in a severe multipath environment as warfighters maneuver through urban canyons, and within and alongside buildings. Highly intermittent connectivity could consume network management functions to the detriment of operational needs. Precise geolocation will be required, and traditional GPS techniques will not work in most situations. It may be possible to use some form of attritable relay or other techniques to enhance communications in this environ.

In forested environments there will be severe attenuation of rf signals. The SAS will require innovative techniques such as variable bandwidths and frequency diversity to maintain connectivity and communications.

Mountainous areas provide some challenges similar to urban, but the ranges are longer and relay sites are less accessible.

Situation Awareness System Goals



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|--|---|
| <p>■ Reliable Communications</p> <ul style="list-style-type: none">■ Restrictive terrain■ 200 km X 200 km area■ ~ 100% availability■ AJ/LPI/LPD■ Protected against info warfare■ Infrastructureless■ Scalable to 10,000+ combatants■ Self-configuring/maintaining/repairing■ Near real time | <p>■ Full Situation Awareness</p> <ul style="list-style-type: none">■ Right info to the right person at the right time■ 10 minute awareness bubble■ ~ 1000 objects■ 3 m geolocation accuracy (non-GPS dependent)■ Automatic information entry■ Fusion of external and internal sensor data■ Dispersed, collaborative planning■ 30 minute situation forecast■ Data queries■ Small, man-portable■ Lightweight, < 1 kg w/o batteries |
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The SAS is scaled to support small unit operations over an approximately 200 km x 200 km area of operations and to accommodate 2 to 10,000+ users. Near 100% availability of communications is an objective. Advanced and innovative techniques such as parallel channelization, coherent IF, software radios, etc., will be needed to gain sufficient range/bandwidth to maintain connectivity. The SAS is being designed to provide LPI/LPD communications capability and to operate in moderate jamming environments. The SAS communications network will be self-configuring and not require a net administrator. When network problems occur, the network will self-heal. The SAS is a “Come as You Are” system - that is, it does not require an infrastructure to be emplaced before it is brought into an area of operation.

The main purpose of the SAS is to provide situation awareness and understanding to the battalion commander down to the individual soldier/marine. This is accomplished by getting the right information to the right person at the right time. It accomplishes this by providing an information bubble around each node that provides information on any objects within an 8-10 minute bubble. We estimate that this is no more than about 1000 objects. In addition, an integrated GPS/non-GPS precision locating system is included to provide position data to 3 meters or less. Wherever possible, information entry should be automatic and not distract the warfighter from performing his mission. Data fusion will be accomplished at the WTA to link related events and objects. Data filtering will be performed by the WTA and IWS to avoid information overload and to ensure that the right information gets to the right person. The SAS will provide a means for dispersed warfighters to conduct collaborative planning sessions. In addition, execution of plans will be monitored and compared to forecasts of events and movements. Tactical opportunities will be identified for potential leveraging. Individual soldiers will be able to request data through advanced data queries.

The entire IWS will be designed to weigh less than one kg. Significant emphasis will be placed on establishing a man-machine interface that is non-intrusive and intuitive. The IWS must be affordable for issue to the individual warfighter, therefore a unit price goal of \$5,000 has been established.

Situation Awareness Provides the Future Tactical Edge



Self-synchronizing forces

Increased speed of command

C4I matched to combat power

Decentralized empowerment

Alternative command structures & procedures

Self adapting and learning organizations

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Warfighters empowered with situation awareness will be able to develop and employ new warfighting tactics and techniques, and refine existing tactics to take advantage of significantly improved understanding of the battle.

Acquisition Strategy



Five independent SAS studies underway

Multiple enabling technology developments

SAS recompile 2Q FY98

- Multiple design awards
- Downselect to single builder

Approximately \$65M over 5 years

Situation Awareness System Schedule/Milestones

